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ABSTRACT

This study focused on providing insight into online teaching and learning by analyzing the electronic discourse and examining its context--the design, development, and implementation. The inquiry used a case study methodology on a sample of 15 participants to discover theoretical positions. The framework was based on one main question with two ancillary probes which are discussed in detail: "How is the introduction of the World Wide Web technology changing pedagogical practices?"; "How does the technology help reshape roles for teachers and learners?"; and "How does the technology encourage new and different types of interactions in the classroom?" The setting for the study was an undergraduate, senior-level course and graduate, "Media, Technology, and Diversity," designed to examine the influence of stereotypes and the values and beliefs of the designers on media products. A summary of research findings and practical implications is provided. The course production and implementation timeline and the syllabus are appended. (AEF)

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ED 419 517

CHANGING ROLES, CHANGING TECHNOLOGIES: THE DESIGN, DEVELOPMENT, IMPLEMENTATION, AND EVALUATION OF A MEDIA TECHNOLOGY AND DIVERSITY ON-LINE COURSE

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

In recent years, the *Educational Researcher* has published a series of articles on the Internet and teaching and learning[1] (Fetterman, 1996, Mergendoller; 1996; Owston, 1997; Windschitl, 1998). These inquiry on the Internet as a promising educational tool stems from the increasing numbers of special classroom activities and collaborative projects, undergraduate and graduate courses, and degree programs being offered on the Internet. Educational curricula now include The Virtual Classroom (University of Connecticut), The Cyber Classroom (Florida State University), Cyberschool (Virginia Tech), World Lecture Hall (University of Texas), and innumerable on-line courses. Regent University in Virginia is offering a Doctoral Program of Studies in its College of Communication and Arts. Educational application of the Internet ranges from electronic mailing for personal and/or administrative matters, to using listservs, Webchats, Newsgroups, bulletin boards, and videoconferencing to supplementing classroom instruction and communicating entire course content, as some universities have implemented. These networked computer and telecommunication technologies have dramatically changed many classroom practices and distance education practice (Dede, 1996).

The most recent *Educational Researcher* article entitled, *The WWW and classroom research: What path should we take?* delineated some meaningful research questions and methods to help inform educators about on-line teaching and learning (Windschitl, 1998). In that article, Windschitl encourages educators to use a qualitative methodology to "investigate and document the real changes that are occurring as a result of Internet-based teaching and learning" (p. 31). The explicit concern is to discover and clarify the on-line teaching and learning phenomena using grounded theory methods.

Consequently, in keeping with the qualitative tradition to clarify obscure phenomena, this study focused on understanding on-line teaching and learning by analyzing the electronic discourse and examining its context--the design, development, and implementation. The inquiry used a case study methodology on a small sample (15 participants) to discover the theoretical positions. The framework used for this examination and description was derived from Windschitl's arguments for "a stronger research focus on the aspects of learning and teaching in K-12 classrooms as influenced by the use of the WWW (1998, p. 29). Although he poses several research questions, the present framework is based on one main question with two ancillary probes:

- How is the introduction of the WWW technology changing pedagogical practices?
    1. How does the technology help reshape roles for teachers and learners?
    2. How does the technology encourage new and different types of interactions in the classroom?

Windschitl suggests that these questions should be addressed in K-12 classrooms, but this study uses a higher education setting for examination because I believe that in this case, lessons learned in higher education on-line classrooms can inform K-12 on-line teaching and learning practices. The response to Windschitl's main research question commences with a brief literature review of on-line teaching and learning research, after which the setting of the media technology and diversity (MTD) on-line course is described. The ancillary probes are used to describe what happens to the MTD participants. Lastly, a summary of the analysis provides specific research findings and practical implications for on-line teaching and learning.

How is the Introduction of the WWW Technology Changing Pedagogical Practices?

Prior scholarly material (Owston, 1996; Scardamalia & Bereiter, 1996; Windschitl, 1998) have distinguished between the WWW's pedagogical affordances as an information source and its affordances as a new student learning environment. As a form of information technology, the WWW offers a graphical, interactive, user-friendly interface to access and search global databases. These databases often present multimedia information; containing text, graphics (such as photographs, diagrams, or maps), sound, and video. Although these multimedia characteristics make the WWW appealing to students (Owston, 1996; Papert, 1993), others (Mergendoller, 1996; Windschitl, 1998) argue that effective learning environments need to provide more than glitzy information. Internet learning is mostly attributed to meaningful teacher-designed instructional activities. The latter set of studies propagate Clark's (1994) observation that media technology is simply a medium and learning improvements only result from systematically-designed lessons.

A number of studies have demonstrated that well-designed Web-based instruction promotes improved learning. Fetterman (1996) found that using videoconferencing in his courses via the WWW allows for more immediate, interactive forms of contact and effective non-verbal "language." Teachers in the Apple Classroom of Tomorrow project found that when computers were available in the classroom, their teaching style allowed for greater autonomy in student learning, a shift in teacher role from authoritarian to

learner, and a shift from didactic to project-based approaches (David, 1992). Well-designed instructional activities on the WWW facilitate critical thinking, problem-solving, writing, and group interaction or collaborative skills (Uchida, 1996). The controlled study of the Computer Supported Intentional Learning Environment (CSILE)--parts of which use the WWW browser in lieu of client software--demonstrated improved knowledge construction. The CSILE found that students could maintain sustained involvement in reciprocal teaching and learning activities with people outside the school (Scardamalia & Bereiter, 1996).

The potential for improved learning is accompanied by some challenges for the teachers and learners (Dede, 1996; Hiltz, 1994; Ruberg, 1994). While the use of these computer and telecommunications technologies is growing, very little is known about teaching and learning in this complex and fast changing social environment. Thus far, instructional efforts in the on-line environment have generally been exploratory. Teachers, technical experts, and instructional designers are faced with the challenges of understanding and harnessing the opportunities presented by the WWW environment. Teachers and learners are insecure about their roles in on-line interactions, especially when they are using unreliable beta-version software (Fetterman, 1996). Besides, research on human-computer relationships alert us that learning is facilitated when interfaces are familiar and easily understood (Hannafin & Park, 1993; Norman, 1993). Yet, course homepages consistently utilize complex frames and intricate links that confuse users. In spite of these challenges, on-line instructional activities are pervasive in traditional and distance education classrooms.

The Case of a Media Technology and Diversity On-line Course

As the fascination for on-line teaching and learning grew, instructional designers at the Virginia Tech Instructional Systems Development program explored suitable course content for the Web environment. Early studies (Harasim, 1990, 1993; Hiltz, 1994) suggested that the textual milieu of computer-mediated communication (CMC) environments was suited for writing-intensive courses. These findings inspired a course design to explore the relationship between media technologies and diversity. The instructors aimed to encourage intensive on-line discussions on the inherent cultural and gender biases of Internet media technologies.

Field Site Information

General Setting

The setting for this study was an undergraduate (senior-level) and graduate course: Black Studies 4984/EDCI 5774 Media, Technology, and Diversity (MTD), a course offered for the first time during Summer, 1996. The MTD course was designed to examine the influence of stereotypes and the values and beliefs of the designers on media products. The students as media technology designers would assess their own stereotypes, values and beliefs. The on-line instructional activities included chat discussions, digitized off-line assignments, and designing biography Webpages. The final project was a multimedia presentation on some topic related to diversity, based on the principles of instructional design they had learned in the class. The documentation from the orientation sessions and on-line interaction was archived and analyzed for this study.

Participants

The participants of the study included the team-teachers, two teaching assistants, and eleven consenting students (8 graduates and 3 undergraduates). The instructors were Virginia Tech faculty members, Dr. Glen Holmes and Dr. Joyce Williams-Green. The MTD course was the first collaborative teaching venture of these two. Dr. Glen Holmes was an Instructional Technologist with the Virginia Tech Department of Teaching and Learning, who had five years of college teaching experience. Dr. Joyce Williams-Green was the director of the Virginia Tech Black Studies program. She is interested in the relationship between multicultural/diversity issues and student academic achievement. The rest of the participants included two teaching assistants and the eleven consenting undergraduate and graduate students.

Course Delivery Details

The MTD course occurred over a 5-week time period in a university summer session. The instructors began the course with three face-to-face sessions with their students. The remainder of the course instruction and discussions were offered on-line (at times convenient to the students). The three face-to-face sessions served to orient the participants to each other, the course materials and course format (see Appendix A for a description of these sessions in timeline). All subsequent on-line interaction focused on the content of the course.

Instructional Components

The on-line instruction was comprised of on-line and video (on reserve at the Virginia Tech library) resources, assignments, and activities. The instruction was divided into

four units. Each unit had its own lecture notes (as Web documents or as Portable Document Format [PDF] slides), resources, assignments, and activities. Each unit and its corresponding materials were placed on-line, one unit at time. Students were strongly advised to complete the units sequentially and promptly (see *Syllabus,* Appendix B). All instructional materials including the on-line syllabus could be accessed from the course homepage.

Equipment and Facility

The hardware equipment available for this project included a 486 Windows Computer with one gigabit of RAM, color flatbed scanners, and laser printers. The software programs included server software, CGI scripting, relational databases, Shockwave, Webchat, QuickTime™, image map generator, word processors, Eudora, WYSWIG editors, Adobe Premier, Acrobat, and Photoshop, and presentation graphics. The available facilities included copy machines, telephones, meeting rooms, etc. The College of Arts and Sciences and the Educational Technology Laboratory (ETL) provided these facilities and equipment, both at Virginia Tech. The MTD on-line course materials could have been developed satisfactorily on either the Macintosh or Windows platforms. The project developers constantly contended with end-user accessibility issues; ensuring that users with either platform and with older versions of software and equipment could access course materials (G. A. Holmes, personal communication, November 14, 1996). Students were informed at the second class session that they needed access to a reliable computer. The list of required software and plugins were listed on the course homepage. These plugins could be downloaded from the links on the homepage. Despite these provisions, one of the students resented clearing his hard drive to make room for the

necessary plugins and software programs. He voiced frustration with the equipment and software and felt it impeded his progress during the course. The other students had access to on-campus computer labs and expressed no accessibility problems.

Data Sources and Collection/Recording Procedures

The data sources were comprised of field notes of design phase meetings, course syllabus and homepage documents, artifacts of the course design phase, copies of biography pages, Webchat and e-mail archives, students' records, interview data, and investigator. Ms. Brown, one of the two Teaching Assistant kept the design phase records which included meeting minutes, course syllabus and homepage documents, artifacts of course design phase, and copies of student biography designs. She gave the investigator photocopies of these data sources. Dr. Holmes, as the MTD course design technical expert, archived the Webchat postings and gave a copy to the investigator. Dr. Williams-Green kept archives of their e-mail communication and gave copies to the investigator. Face-to-face interviews as well as on-line interviews using electronic mail were conducted using an "interview guide" (Patton, 1990). The investigator audiotaped and transcribed the interviews and kept a journal as an audit trail. These multiple sources of data coupled with the researcher's reflective journal were rich sources for understanding and describing what happened at various levels in this on-line course.

The intention for the discourse analysis of the Webchat and the available email archives was to determine the temporal, topical and sequential characteristics of the electronic discourse. This study analyzed the entire electronic archive; all Webchat postings and e-mail messages. The NUD*IST Qualitative Solutions and Research software was used to

analyze the extent of the students' participation in the electronic discourse by determining the frequency and category of participants' messages. Both deductive and inductive categories were used.

How does the WWW Technology help reshape roles for teachers and learners?

The course content and complexity of the on-line environment reshaped the teachers' role during the design and development phases. At the inception of course design and development, the design team assumed distinct roles. The original plan for the MTD course development called for Dr. Holmes to assume the roles of instructional designer and technician. Dr. Williams-Green would assume the role of content expert. Ms. Brown "was brought in to organize and coordinate design team meeting, obtain resources, search of materials and seek clearance" (G. A. Holmes, personal communication, February 3, 1997). She was a graduate assistant with the Black Studies program and was Dr. Holmes' advisee. Furthermore, Ms. Brown had previously taken some Instructional Technology courses with Dr. Holmes.

The roles quickly evolved to address the emerging needs. Dr. Holmes found it necessary to train the design team members to assume technical and learner roles. He later assumed a fourth role as content expert as he produced course materials for Unit 4. Dr. Williams explains, "I had to create Webpages, learn to use HTML editors and image imbedding" (J. F. Williams-Green, personal communication, February 26, 1997). Ms. Brown's role evolved from design team coordinator to course designer/developer, and then to student.

Based on the need to convert questionnaires and course activities into on-line forms and simulations, it was necessary to hire someone with Common Gateway Interface (CGI) experience, who also had access to a second, external Webserver where the CGI software was located. The design team hired a second Teaching Assistant, Delia Greenville.

Ms. Greenville also played dual roles; liaison between the College of Arts and Sciences (CAS) and the Instructional Systems Development program in the College of Human Resources and Education (CHRE), as well as technical support with the CAS Web server and Common Gateway Interface (CGI) software programs. Her security clearances with the CAS server were vital to exchange data and generate output between the CHRE and CAS servers. Ms. Greenville's major contribution in the MTD project was to facilitate the generation of the on-line questionnaire forms by converting the multicultural resources on the CAS server MTD course materials and questionnaire forms. During the implementation phase, the teachers and students assumed largely traditional roles. Most MTD students recalled needing technical and navigational assistance because of the unfamiliarity of the on-line environment. They sought assistance from Ms. Brown, who functioned as Teaching Assistant and student.

In summary, designing instruction for such a complex and fast-changing environment required a team whose members were highly skilled in their areas of expertise, yet were willing to learn new skills and assume new roles. It was necessary to design with the lowest-common denominator end-user in mind. Hence, although designers may have access to the top of the line equipment and software, it was wise to consider the end-

user's equipment and software. Lastly, designing for the WWW required a major time commitment. Even with a team of four very proficient professionals, the MTD on-line course took 2,000 person hours to produce. Instructors were pleased with the design outcome; a reusable template for a second iteration of the MTD course in 1997. Students acknowledged that the course, specifically, the Webchats helped them develop more insight and sensitivity towards diversity issues. The instructors admitted that the time commitment required in developing and implementing the course materials detracted from the time spent on facilitating student learning.

How did the WWW technology encourage new and different types of interaction in the classroom?

Several prior studies on electronic discourse analysis have demonstrated that as a Computer-Mediated Communication environment, the WWW encourages unique forms of "classroom talk." In analyzing general, live classroom discourse, Cazden (1988), Mehan (1979), Cazden and colleagues (1974) found the most common sequence in teacher-led speech events is "Initiation-Reply-Evaluation" (IRE). Later studies have indicated some variations of the sequential structure of classroom discourse that reflect differences in educational purposes for the discourse. Cazden (1988) explains that these variations are based on the number of participants (teacher and one student instead of a group), the medium of interaction (electronic mail instead of oral), and the cultural differences among students.

One constitutive ethnographic study offers some interesting results of in-depth analysis of electronic discourse. Constitutive ethnography is a research strategy which describes the social organization of routine, everyday events (Mehan, 1979). Quinn, Mehan, Levin, and Black (1983) examined instructional interaction among people using a computer-based electronic message system or e-mail, contrasting it with conventional face-to-face discussion in a college level class. They found that the electronic discourse differed from face-to-face classroom discussions in three ways:

1. A temporal difference between initiations and responses
2. A topical difference
3. A structural difference

Mehan and others (1984) found that the temporal nature of the electronic discourse had a different effect on the interaction between students and the course instructor. Mehan's earlier studies (1979) had indicated that large gaps are disruptive in everyday conversations. However, in an electronic environment, the lag time of hours or even days between initiations and responses did not seem to disrupt the flow of the conversation (Quinn, et al., 1983). These findings were replicated in later years (Levin, et al., 1990; Mehan, et al., 1983; Ruberg, 1994).

More interesting, Mehan and his colleagues (1983) also found significant differences in the discourse itself. Topically, in contrast to the regular classroom, discussions via electronic mail consisted of half as many teacher-directed questions to the students. The electronic discourse also pursued "multiple threads" rather than only one at a time. In other words, the discussions were course-content driven, not teacher or process.

The Media Technology and Diversity Electronic Discourse Analysis

The Webchat discourse was analyzed for message type and flow using the three elements (Mehan, et al., 1983)--temporal factors (see Table 1), topical or content factors (choice, product, and process postings), and structural sequences (sequential organization of classroom lessons; Initiation (I)-Response(R)-Evaluation (E))-- as deductive categories.

Table 1

Temporal Factors-Electronic Discourse Lag Time Between Initiation and Response (Mehan, 1983)	
Average response time to questions	11/2 days
Range of response time to instructor's discussion questions	20 minutes to 6 days
Range of instructor's response time to student's questions	1-3 days

To guide my analysis, the Webchat inputs were manually grouped into the three categories (temporal, topical, and structural) which were verified by one of the instructors who was a peer debriefer. The unexpected factors were considered as inductive categories and discussed as implications.

During the 5-week course, a total of 235 questions and response were posted in the Webchats. Since the on-line environment supported asynchronous (time-delayed) interactions, most students interacted at their convenience. That arrangement was convenient but resulted in a minimal exchange. The instructors then scheduled 2 one-hour mandatory on-line discussion sessions and posted specific dialogue questions. While both synchronous and asynchronous discourse facilitated on-line learning, each mode supported different types of interactions.

Temporal Characteristics

The result was a considerable difference between the asynchronous and the scheduled synchronous discussion sessions. Most of the postings occurred during the two synchronous sessions; 53% of all the postings occurred during the two scheduled sessions, as opposed to 47% over 17-day or three-week period.

There were also differences in lag time between postings and length of postings. As characteristic of electronic discourses (Mehan, et al., 1985; Levin, et al., 1990; Ruberg, 1994), there was a predictable time lag in the MTD Webchat postings. For example:

> Dr. Wms-G...7/13/96 12:11 PM
CL/CI R1
> The video Ethnic notions generally helps students understand how stereotypes can be exaggerated and the impact that they have on people. I wanted you to view the video as an advanced organizer for Unit 2.<p>
>
> Mary:...7/12/96 4:56 PM
 CT I1
> I found that video, ethnic notions, to be very powerful.

Note the contrast in the dates. The average between a typical initiation and response in the asynchronous sessions was 20 hours. On the other hand, the average time lag during scheduled Webchat sessions was four minutes. The following excerpt exemplifies the minimal time lag:

> Mark:...7/31/96 9:58 AM
S/M R CT
> WOW! I just got on! The server would not connect! You people must be getting really busy chatting on here or something!!!
> Anyway, this is an exciting discussion. Ya'll have some good points on teaching and learning stuff. Personally, I have the naive look on life and have always assumed that culturally there is no difference in the way people learn. I always thought it was an individual thing....
> But I reckon if you factor in the way people teach to different cultures with their attitudes and such...That could affect the quality of the teaching...Hmm.
>
> Joe :...7/31/96 10:02 AM
R CT
> Mark...I'm glad you do realize that people (even ethnic or racial) groups learn differently from one another.....our competence is even

> different than one another...especially on how we achieve being competence and even how we define it...<p>

Another major difference between both modes was the average time lag between a typical initiation and response. While the average asynchronous session time lag was 20 hours, the scheduled, synchronous Webchat sessions time lag was four minutes. With such differences, all participants agreed that the instantaneous feedback of synchronous interactions encouraged and enhanced the discourse by increasing participation.

Topical Characteristics

Similar to Mehan's (1983) study, the MTD asynchronous discussions had multiple threads, were course-driven topics, and were marked by a climate of open participation as one topic elicited responses, redirections and building statements. An example of such a sequence occurred on July 16. The topic of *interracial marriages* was introduced and elicited two responses. The second posting called for a definition of *racism,* based on the Marger textbook and then proceeded to ask a question about interracial dating. Here is the Webchat excerpt:

> :...7/16/96 3:08 PM
 CRSTGHTP RESP6 INIT8
> I just finished the When I was young interview. Based on my findings, The environment played a key role in how people get along. The educated black man I interviewed seemed racism is under control in his environment, but the white man from a low class family stated that racism is always a problem in his environment. Not your typical stereotypes, according to modern day society. While interviewing all the individuals, I asked them if they believe in interracial marriages. Only the Japanese female stated that she had no problem with this. HOW DO YOU FEEL ABOUT INTERRACIAL MARRIAGES?<p>
>
> Rachel:...7/16/96 3:19 PM
 CRSTHGTPRESP8
> In response to the question of interracial marriages. I have dated outside of my race. However I do plan to marry a black man. My two brothers are currently engaged to white women. My grandmother and mother have always taught us that love is color-blind. I only have a problem with interracial relationships when the black individual's preference is to date non-black

only. That is when I take it personal and become offended and bothered.<p>

DR. WILLIAMS-GREEN:...7/16/96 3:20 PM
 CRSTGHTP RESP8
How do you feel about interracial marriages? Why did you ask the interviewees that question??

I am not sure that I understand your assessment of the two men in your group. Did the educated black man say that he did not experience racism and the white man did experience racism. Be sure to read Marger's definition of racism.<p>

DR. WILLIAMS-GREEN:...7/16/96 3:21 PM
 CRSTGHTP INIT9
Would dating only in your race be considered racist by Marger?<p>

This threaded pattern was consistent across the asynchronous and scheduled sessions and the topics generally followed the course outline.

As the Webchat grand totals of Table 6 show, there is a noteworthy difference in the course-related posting category between the asynchronous or unscheduled and the Because of the scheduling, all of the postings in this category were considered thought provoking. Participants greeted each other (SOC 20%) and complained about the early start (MECH 16%), and they seemed to have focused on the answering Dr. Williams-Green's questions. There was no course logistic or information submissions during the scheduled Webchat session. Yet the conversation could not be characterized as mechanic, for the students challenged each other's notions and ideas.

Table 2

Grand Totals of Webchat Postings

Code	Asynchronous raw data %	Scheduled raw data %	Overall raw data %
Webchat mechanics	16%	16%	16%
Social postings	14%	20%	17%
Course related	70%	64%	67%
Information submission	15%	0	7%
Course logistics	24%	0	11%
Thought provoking/probing	31%	64%	49%
Total # if postings	100%	100%	100%

Structural Characteristics

The MTD discourse structural characteristics revealed a variation of the IRE Sequence that is common in traditional classrooms and presented some intriguing details about those variations. Mehan (1979) and Cazden (1988) found that teachers almost always initiated (I) classroom discourse, students replied (R) and then teachers would evaluate (E) the students' replies. The MTD study revealed that in asynchronous on-line discussions, students felt freer to initiate discussions. They initiated 55% of the discussions but were reluctant to evaluate either teacher or peer responses. In spite of these initiations, the instructor influenced the direction, tone, and outcome of the on-line discussion as students simply defaulted to the reply mode.

Summary of Research Findings

- The potential for new learning opportunities on the WWW will only be realized by meaningful, teacher-designed activities.
- Instructors should address student access and design with end-user/learner needs in mind.
- The WWW's textual millieu facilitates writing and discussion assignments.
- The WWW reshapes the roles of teachers and some students.
- Designing and developing a course for the WWW is very labor-intensive.
- New and different types of interactions emerge in on-line classrooms.
- Synchronous interaction, with minimal time lag between initiations and replies encouraged greater participation than asynchronous and unscheduled discussions.
- Unscheduled asynchronous interactions are marked by less participation, but encourage more open discussions and increases the number of perspectives on a given topic.
- Students use each WWW feature for distinct purposes.
- Unscheduled, asynchronous on-line interactions encourage more student initiations and student-generated discussion topics

Practical Implications

- Despite the attractiveness of the WWW, not every Web-based instructional event will be successful.
- Instructors need to ensure that the computers and servers are reliable and inform students of hardware and software needs to access instructional materials.

- Use the WWW for carefully designed writing, discussion, and collaborative activities.
- Teachers may have to assume technical and learner roles when designing and developing instructional materials for the WWW. Students with Web design experience may assume teaching and technical roles.
- A team comprising of technical experts and instructional designers may be necessary when designing a a course for the WWW.
- At the very least, teachers need knowledge of instructional design principles.
- On-line courses should plan for scheduled, synchronous discussions as well as, asynchronous, student-generated discussions.
- To minimize confusion in the complex on-line environment, instructors need to designate specific WWW features for specific purposes.
- Web-based instruction should include asynchronous discourse forums such as Chat-lounges or electronic bulletin boards.

In Closing

A panacea, the WWW is not, but its promise of pedagogical benefits continues to attract teachers and learners. It is encouraging to hear a call for critical inquiry into Internet-based pedagogy and to see some responding classroom research. Most Web users agree that incorporating the Internet-based instruction changes interpersonal connectedness and access to global information. Yet the challenge to design meaningful activities persists. How does one design, develop, and implement instructional materials for such a complex, fast-changing environment? The answer is not the Web bashing that is pervasive in our critical higher educational culture. A sensible approach to address on-line teaching and learning questions is by conducting vigorous and persistent research. Currently, there's a

large-scale study of 6 on-line courses underway to using a similar methodology to further enlighten those interested in interested in on-line teaching and learning.

Future research questions focusing on the pedagogy of on-line teaching and learning should include:

1. How does computer expertise and/or access to computer affect group membership?
2. How do the voices of individual participants depending on the computer expertise, intermingle over the construction of class discourse?
3. How does the course content affect student participation and interaction?

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Appendix A
Course Production, Implementation Timeline

Data obtained from design artifacts, Ms. Brown's e-mail archives, WWW homepages, and Investigator notes.

April 19, 1996 Ms. Brown's notes, corroborated by April 22-23 e-mail message sources

Design team 5pm meeting. Discussions on possible on-line course ideas--diversity content, visual literacy, distance education.
Ms. Brown reported on information from some Internet sites. Decided to investigate the use of fractal images.
Decided to call Virginia Tech Educational Technologies for "cost of fractal images."
Record of e-mail response to Dr. Williams-Green voice message by Dr. John Moore and Sharon Pitt of Educational Technologies discussing access by off-campus students to Powerpoint slides/images.
Note from Dr. Moore suggests they use Cyberschool format--converting files to Portable Document Format (PDF) and/or Powerpoint slides.

April 19- May 13

Decision to offer MTD course via WWW is made.
The design team is set and roles are defined.
During this design phase, the three team members assumed these roles: Dr. Holmes was the Instructional Designer and Technical Expert, Dr. Williams-Green was the Content Expert, and Ms. Brown was the Teaching Assistant.
Tentative syllabus calls for 5 units and work begins on those units.

May 13

E-mail from Dr. Williams-Green to Ms. Brown to put course unit 2 on Powerpoint slides.
These lessons included viewing video on Bias and Assumptions, lecture on Stereotypes, and lecture on Racism.

May 13-June 12

Dr. Holmes works on course design and development of homepage. He also sets up Webserver.
Dr. Williams-Green continues to develop content for units 1-3. Ms. Brown turns articles into PDF, creates Powerpoint presentation slides, searches for pictures and images to scan for *Who Will I Hire* and *Lynch* activities.
A new member joins the team, Ms. Greenville . She gets to work on Cyberschool/CAS servers to convert questionnaires/activities/simulations into on-line forms with CGI scripts.

May 23

Student inquiry about taking the MTD course at a distance because she would be in California, leads to this exchange:

Student: I would like to take your summer school course titled Media, Technology and Diversity but I will be out of town for the first week of second summer session. Is there any possibility that I might still take the course? I am interested both in the course content and in the delivery of courses over the Internet. I will register for your course. I may even be able to access the materials over the Internet while at my conference in California.

Dr. Williams-Green: Sure, we will have the first two lessons on video tape and the other info will be on line.

Dr. Holmes : The URL will be activated on Monday 7/1/96. We've decided not to release it prior to that. You may contact me at that time for the correct address.

The first two sessions will be conducted face-to-face but will consist primarily of those things you should already know (e.g., use of Netscape, logging on, installing plug-ins, other software, etc.)

You should be able to keep up comfortably once you return. I'll work with you on this.

Hope you enjoy your vacation!

June 4

Team meeting. Discussions on logistics--sorting out and organizing individual projects.
Dr. Holmes assuming Technical Trainer role, introduces file-naming and directory conventions, server instructions and group decide to use file-naming table to properly label files.

June 25

Dr. Holmes working feverishly on third and fourth iteration of course homepage interface, testing it out on people in ETL.
Dr. Williams-Green decides on tentative orientation schedule, syllabus, and continues to supervise course development materials.
Ms. Brown experiments with CGI forms.
Ms. Greenville continues to convert the questionnaires to on-line CGI forms and sends the results to Dr. Williams-Green.

July 1

First day of class. Activities included:
Introductions by Dr. Williams-Green.
Determining software/hardware needs by Dr. Holmes.
Introduction to the Internet by Ms. Brown.

Introduction to course syllabus and course requirements by Dr.Williams-Green.
Most of the students spent all of the first day getting remedial computer training, while the advanced students began designing the biography on paper.
The first day assignment was to check for e-mail and reply via e-mail. Assignment was part of teacher assessment of computer skill.

July 2

Acrobat software handed out by Ms. Brown
Students learn how to scan images-- Ms. Brown
Introduction to Webpage design and HTML editors-- Ms. Brown
Generating media, sound, text, and audio-- Ms. Brown

July 3

Putting pictures and biographies on the Web. No mandatory class sessions.
Instructor and Ms. Brown were available in the lab.

July 7

The course homepage is ready for viewing:
Date: Sun, 07 Jul 1996 20:46:40 -0700
From: "Glen A. Holmes" <gholmes@vt.edu>
Organization: Virginia Tech
To: Juone Brown <jubrown>, Delia Greenville <degrenvi>, "Dr. Holmes" <gholmes>,
"Dr. Williams-Green" <jfwillia>,
Subject: THIS IS IT!!! -- PLEASE READ THIS (Media, Technology & Diversity NEWS)
X-URL:
http://malachi.etl.vt.edu/mtds296/_Root/LESSON01/_ANCHOR.HTM

Finally, we've done it!

You should be able to access the first unit, etc. of the course using this URL:
http://malachi.etl.vt.edu/mtds296/start.htm. It will be active by 8:00 AM, Monday, 7/8/96.

We've deliberately omitted units 2-5 because we want to see how the first unit goes on-line.

Remember to download all your supporting software (plugins, etc.) BEFORE you try to view the
lessons.

This is a first trial for us. We are hopeful that everything goes well for you. We can be
reached at our offices 231-XXXX / 231-XXXX after noon on Monday, 7/8/96.

It may be necessary to convene the class face-to-face if we experience major problems during
delivery. We are hopeful that this will not be necessary. Please stay alert for additional
details sent via e-mail.

Good luck and smooth sailing!!!!!!

Dr. Joyce Williams-Green
Dr. Glen Holmes

The Webchat is ready as well:
:...7/8/96 10:56 PM
MECH
Hopefully, I am finally up and ready to go!!!
This is a test.<p>

Glen Holmes:...7/8/96 9:27 AM
This is a test<p>MECH

July 9

The entire team continued working on units 2-4

July 17

Frustrations expressed on Webchat:

Dr. Williams-Green:...7/17/96 9:04 AM
INIT CRSTGHTP
Comments from others PLEASE!! This is rich material and I love talking about it. I believe that talking about it will help US change this paradigm and WE can change the world!!<p>

Rebecca:...7/17/96 10:16 AM
 INIT CRSLOG/CRSINFO
I hate the asynchronous nature of this medium. I would love to have some discussions on this material too. what can we do? Schedule a chat session for a time when lots of students will be poised at their computers? Have a real live class? Are we forbidden to do that? <p>

Dr. Williams-Green:...7/17/96 11:47 AM
RESP CRSLOG CI/CRSTGHTP INIT
I have been thinking about scheduling a time for an on-line chat session. Since the class is scheduled for 9:00am. How about 9:00am on Monday? I am providing an asynchronous learning environment was one of our design goals. I agree that it is not the ideal way to discuss these issues. WE may find that using this technology may not be the best way to teach issues like these. We welcome ideas. Let's see it if the Monday chat works. WE have made chats a REQUIRED ASSIGNMENT for UNITS 3-5. I think this will help some.

August 8

Last day of class and Instructor posts this message:

X-Sender: jfwillia@mail.vt.edu
Message-Id: <v01540b03ae3140a01d07@[128.173.37.48]>
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Fri, 9 Aug 1996 14:27:40 -0500
To: jubrown, gholmes, jfwillia,

From: jfwillia@vt.edu (Joyce F. Williams-Green)
Subject: Course Grades
Status: RO

Some of you have asked to have an extension or and incomplete grade (I) concerning the assignments and I have given you permission to do so. However, I must inform you that those of you turning assignments in after 5:00pm tomorrow will not be able to earn a grade higher that "A-".

This is only fair to those students who worked to complete their assignments on time and to forward them to me on or before August 10 at 5:00pm.

Appendix B
Syllabus

MTD ©1996 Holmes/Williams-Green & Virginia Tech

Instructors: Dr. Joyce Williams-Green (jfwillia@vt.edu) and Dr. Glen Holmes (gholmes@vt.edu)

Office Hours:

Required Text(s):

1. Bennett, Christine (1995). Comprehensive Multicultural Education Theory and Practice, ISBN 0-205-15024-1
2. Castell, G. G. (1994). Instructional Development-Process and Technique, ISBN 0-534-21378-2
3. Copy Packet (on reserve in Library and Black Studies 256 Lane Hall)

Requirements:

Students are required to complete both on-line/off-line activities and assignments. The nature of the activities and assignments vary and may call for individual as well as group interaction. All activities will be monitored. All assignments will be graded. The sections below provide a general explanation of these requirements:

On-line activities

Include such things as web-site visits, email, completing forms and surveys, interactive multimedia presentations, tutorials, simulations, and the like.

Off-line activities

Include such things as data collection, reading, viewing audio visuals (videos, TV programs, etc.)

On-line assignments

Include such things as chat discussions, posting completed off-line assignments, completing formative course evaluations, knowledge/skill assessments, and the like.

Off-line assignments

Include such things as writing papers, gathering and summarizing

data, project planning and preparation, and the like.

Assignments must be completed by the due date in order to receive maximum point value. Students are responsible for knowing when assignments are due (Please see the main menu Assignment Schedule link). Some activities and/or assignments may require students to obtain other materials not available on line (e.g., reserved library materials, videos, and the like). Please contact our graduate assistant (Juone Brown jubrown@vt.edu) for further information.

The final project (note project evaluation form) will be a multimedia presentation concerning some topic related to diversity. The accompanying documentation should present references relevant to the project as well as describe the project's goals and real or anticipated outcomes.

Virginia Tech Honor Code policies will be in effect throughout this class.

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[1] Henceforth, "on-line teaching and learning" will be used to include student access to multimedia and information databases on the World Wide Web (WWW) and instructional and learning communications via the WWW.